THE CHANGING FISHERIES OF LAKE VICTORIA, UGANDA

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Abstract

Lake Victoria had a complex multi-species fishery dominated until the late 1970s by the tilapiine and haplochromine cichlids but with important subsidiary fisheries of more than 20 genera of non-cichlid fishes. Since the 1980s, however, the fishery has been dominated by the Nile perch (*Lates niloticus*), Nile tilapia (*Oreochromis niloticus eduardianus*) - both introduced into the lake during the late 1950s and early 1960s - and *Rastrineobola argentea*, a pelagic cyprinid. Although the actual landed commercial catch figures from the Uganda sector of the lake point to the increased landings since 1984, the catch rates in the experimental trawl fishery and mean weight of fish in both experimental trawl and commercial fishery have been on the decline.

Introduction

The basic objectives of the Fisheries subsector, in Uganda, include (i) stepping up production of fish in order to bring about self-sufficiency in fish products, bearing in mind rational exploitation, thereby contributing to the supply of animal proteins and raising per capita consumption of protein, and (ii) to contribute to foreign exchange earning by export of fish. To this end one of the current development objectives of most activities of the subsector is the exploitation of fishery resources (a) for export, (b) for creation of employment and (c) as a major source of food and animal protein.

The total annual fish catch in the Uganda waters in 1990 increased to a level of 245,000 metric tonnes of which about 120,000 tonnes (49%) came from Lake Victoria. On the basis of increased fish landings from Lake Victoria during the recent years (since about 1984) there seems to be a general feeling that there are currently significant harvestable fish stocks in the lake. This has inevitably resulted in many individuals and firms to invest in the harvesting, processing and export of these stocks; this is in addition to the existing subsistence and domestic uses. Export of fish products at a sustainable level along side other uses requires knowledge of the availability of fish stocks over time, among other requirements.

In the absence of adequate information on stocks during the last two decades, the ability to forecast the available stocks in Lake Victoria over time has been limited. However, there is strong evidence that the Lake Victoria fishery has had dramatic changes in its stocks since the beginning of the century. This paper, therefore, focuses on the changes that have taken place in the Uganda sector of Lake Victoria with particular reference to native species, introduced species and, generally, fish production.

Native Species

The fishery for tilapiine cichlids is among the oldest fisheries in the lake. At the beginning of this century the species exploited were mainly *Oreochromis esculentus* and *O. variabilis*, both native to the lake. The catch of *O. esculentus* contributed 60% by weight of the total annual fish yield in 1908 (Graham 1929). This figure dropped to 25% in 1958 and to only 8% in 1959. The catch per unit of effort of the accessible stocks, particularly the tilapiine cichlids *O. esculentus* and *O. variabilis*, declined from 30 fish per net of 127 mm (5 inch) mesh in 1921 to 6 fish in 1928 and 2.9 fish in early 1940s.

The potamodramous species of *Labeo, Schilbe, Alestes, Barbus* and *Synodontis* have now almost disappeared from the catches in the main lake. Historically these were the major fisheries in the lake but are now occasionally caught with gillnets. *Labeo victorianus* (popularly known as Ningu) formed the most important commercial species along the affluent rivers of the Lake Victoria basin (Cadwalladr 1965 and 1969). This fishery deteriorated steadily following the intensive gill-netting of gravid individuals on their breeding migrations. In Lake Victoria *Labeo* catches declined from 10.5% of the total landed catch in 1958 to less than 1% in 1970. Over-fishing of *Labeo* affected 13 other anadromous or anadromous-like fish species (Whitehead 1959). These included *Barbus altianalis, Schilbe mystus, O. variabilis, Alestes spp, Synodontis spp, Clarias mossambicus, Bagrus docmac* and *Protopterus aetheiopicus*. However, *Bagrus* and *Protopterus* species still continued to feature significantly in the commercial fishery (Fig 1B).

The lake Victoria fish community was originally dominated by haplochromine cichlids (Fryer and Iles 1972, Witte 1981). These comprised at least 80% of ichthyomass (Kudhongania and Cordone 1974) classified under about 11 trophic groups which were dominated by phytoplanktivores and detritivores (Greenwood 1974, Witte 1981).

With the constantly declining catches of the traditional table fish species, the exploitation of the small haplochromines was intensified during the 1960s. This involved the increased use of beach seines. Catches of haplochromines increased from unknown figure in 1950s to 18.75% by weight of total commercial yield from the lake in 1968, dropped sharply to 2.6% in 1970, rising steadily again to around 10% in 1978/79 before tailing off (Fig 1B). The abundance of the haplochromines in the northern part of the Uganda sector of the lake decreased dramatically from 668 kg/hr in 1969/71 to 294 kg/hr in 1982 and down to less than 5 kg/hr in 1985 (Table 1). Consequently the catch rates in the experimental trawl fishery in the same area declined from 797 kg/hr for all fish species 1969/71 to 355 kg/hr in 198 down to 166 kg/hr (Table 2a). The contribution of the haplochromines in the commercial and experimental catches in the Jinja area of the Lake also decreased drastically during the period (Table 2a). However, the stocks of haplochromines could presently be considered to have been drastically reduced to very low levels in the inshore waters but not necessarily wiped out.

Rastrineobola argentea, a pelagic cyprinid, is another native fish species in Lake Victoria. In the Uganda portion of the lake, *R. argentea* locally known as 'Mukene' has until quite recently been minimally harvested. It was not until the decline in catches of many preferred native fish species that attention shifted to exploiting Mukene. Mukene first featured significantly in commercial catch records in 1987 when it contributed 2.15% of total catch by weight from the Uganda sector of the Lake (Fig 1B). In Masese Fish Landing (one of the few major landing points for Mukene) the contribution of Mukene to the landed commercial catches rose from 0.47% in 1982 to 30.08% (second to Nile perch (*Lates niloticus*)) in 1989 (Table 2a). The increasing demand for Mukene as a cheap source of fish protein and as an ingredient in the animal feeds has encouraged such a rapid growth in its exploitation on Lake Victoria that the species now ranks third to Nile perch and Nile tilapia (*Oreochromis niloticus*) in the commercial catches from the Uganda sector of the lake during 1988 and 1989 (Fig 1B).

By the end of the 1960s, therefore, lake Victoria (Uganda sector) was still a multi-species fishery where the commercial landed catches consisted mostly of the cichlid fishes (*Haplochromis* and *Oreochromis*) as well as a number of associated non-cichlid fishes like *Bagrus*, *Synodontis*, *Clarias*, *Protopterus* and *Barbus*, although over 80% of the ichthyomass was composed of the haplochromines (Kudhongania and Cordone 1974).

Introduced species

Exotic tilapiines (*O. niloticus*, *O. leucostictus*, *Tilapia zillii* and *T. rendalli*) were introduced into Lake Victoria during the late 1950s (EAFFRO 1974, Welcomme 1967). Following these introductions, the tilapiine species exploited currently is mainly *O. niloticus* although *O. variabilis*, *O. leucostictus* and

T. zillii also occur occasionally. The bulk of the commercial catch during 1960s and 1970s was contributed by the tilapiine cichlids (Fig 1B), particularly *O. niloticus*. In 1965 the tilapiine cichlids contributed 86% by weight of the annual commercial catch from the lake; this figure dropped to 23% in 1980 and 2.3% in 1985 before beginning to rise again to 20.9% in 1990 (Fig. 1B).

The Nile perch (*Lates niloticus*) was introduced into Lakes Kyoga and Victoria basins in mid-1950s but its presence in Lake Victoria was first noted in 1960 (Gee 1965); it took it more than 10 years thereafter to get fully established in the new ecosystem. The Nile perch and the Nile tilapia (*Oreochromis niloticus*) are native species to Lake Albert, the River Nile below Murchison Falls, Lake Turkana, the Chad basin and rivers of West Africa (Lowe-McConnell 1988)

When the stocks of Lake Victoria fishes were defined during a joint survey conducted by UNDP/FAO and EAFFRO in 1969/71, the contribution of *Lates niloticus* to the total demersal ichthyomass of the lake was then insignificant (Table 1). Catches of *Lates* became significant from 1975, 1977 and 1978 in Uganda, Kenya and Tanzania sectors of the Lake, respectively (Fisheries Department Annual Reports, 1960 onwards, Bergstrand and Cordone 1971, Ssentongo and Welcomme 1984). Following the establishment of *Lates* in lake Victoria, total fish yield increased significantly (Fisheries Department Annual Reports 1970-1980, Fig 1A). *Lates* contributed more than 50% by weight of the commercial catches at most landings around the lake (Ssentongo and Welcomme 1984, Fig 1B). The minimum average total fish production in the Uganda sector of the lake has been estimated at 80,000 metric tonnes per annum in recent year (1984-1990) of which over 60% was *Lates* (Fig 1B).

There is presently strong evidence from the commercial and experimental fishing that *L. niloticus* is well established in Lake Victoria(Okaronon et al 1984, Okaronon and Kamanyi 1986, Okaronon 1990). At Masese Fish Landing near Jinja, for example, the proportion of *L. niloticus* in the commercial catches increased from 0.4% of the total catch by weight in 1981 to 62.7% in 1983, setting around 50% thereafter (Table 2a, Fig 2). Experimental trawl catches from the UFFRO research vessel IBIS in the Jinja area of the lake show a similar trend in catch composition (Table 2b). Despite decline in catch rates for all fish species in the experimental trawl fishery in the northern portion of the lake, the catch rates for *Lates* in the same area significantly increased from about 1 kg/hr in 1969/71 to 57 kg/hr in 1983 and 159 in 1985 (Table 1). However, during the period 1981/85 the mean size of the individual fish (*Lates*) caught in the experimental trawl declined from about 5 kg in 1982 to less than 1 kg in 1985 (Table 3). A similar decline was recorded in the commercial landings in Masese where the mean weight of Nile perch landed dropped from about 9 kg in 1982 to about 2 kg in 1989 (Table 3).

Fish Production

The total landed catch from Lake Victoria (Uganda), steadily increased between 1952 and 1969, then declined during the 1970s and early 1980s before beginning to pick up again in 1985 (Fig 1A). Lake Victoria was leading in fish production up to 1968 during which period it was contributing between 30% and 50% of national fish production (Fig 1A). After 1968 most of the fish production in Uganda came from Lake Kyoga before the Lake Victoria fishery began to pick up again to surpass Lake Kyoga in 1987. During 1990 fish production from Lake Victoria (Uganda) was estimated at 119,900 metric tonnes (48.9% of national production) down from 132,400 tonnes (61% national production) in 1989; the projected figure for 1991 is 129,850 tonnes. Of the 1990 production, 76.1% was *L. niloticus* and 20.9% tilapiines; the rest was composed of *Clarias* (1.3%) *Bagrus* (0.7%), *Rastrineobola* (0.6%) and *Protopterus* (0.4%).

During the very recent past (since 1988) the landed commercial catches from Lake Victoria continued to be dominated by Nile perch and Nile tilapia. In November 1991 the landed commercial catches for fresh fish in Bukakata - a major landing for fish from the Ssese Island waters (Fig 3)- consisted of about 70% Nile perch and 20% Nile tilapia; the catch from the experimental nets was mostly Nile perch. Similarly, in Kasenyi Fish Landing in Entebbe the landed commercial catches for fresh fish in January 1992 was composed of Nile perch (87.1%) and Nile tilapia (12.8%).

In Masese Fish landing near Jinja, catch assessment records by UFFRO staff revealed that the landed commercial catches for fresh fish during the period June 1988 and October 1991, inclusive, averaged 7,591 kg for all species a day consisting mainly of *Lates niloticus* (62.5%) and *Oreochromis niloticus* (37.2%) (Fig 4). The daily landings fluctuated greatly during the period with the highest average landings of 9,172 kg average for all species being recorded in 1989 and the lowest recorded average daily landings of 5,685 kg for all species - affecting mainly *Lates niloticus* - was in 1991 (Fig 4). The low records between October 1990 and October 1991 are attributed to smuggling of fish, among other reasons. It is to be noted that it has become a common practice for fish-mongers (both nationals and non-nationals) to buy fish direct from fishermen at the fishing ground which fish is then landed in the neighbouring countries.

Possible causes of changes in fish stocks

The gradual collapse of the native fisheries in Lake Victoria has been attributed to the systematic over-exploitation of the inshore stocks through the intensification of the gillnet fishing and progressive decrease in gillnet mesh size (Cadwalladr 1969). At the beginning of this century fishing was for subsistence needs and the fishing effort was initially low and consisting of locally made traps and hooks. The introduction of the more efficient flax gillnets during 1916 (and synthetic-fibre gillnets in 1952) stimulated higher catches mainly of *O. esculentus* around the entire lake. But uncontrolled entry into the fishery soon resulted in the decline of the catch per unit of effort in the legal 127mm mesh gillnets to unprofitable levels consequently forcing the fishermen to progressively reduce the mesh size of the nets in use. This practice led to localised over-fishing of certain stocks, particularly *O.esculentus*, to levels so low that they could not recover because of the drastically reduced rate of recruitment.

In 1933 the minimum mesh gillnet of 127mm was implemented for Lake Victoria with the aim of protecting the declining *O. esculentus* fishery. Because of management and logistical problems, given the trinationality status of the lake, this restriction/regulation was repealed by Tanzania and Uganda in 1956 and Kenya in 1961. The justification for lifting the restriction were (1) that in a multispecies fishery where the various species mature at different size ranges, a management policy based mainly on single species posed constraints and (2) that the measure would enable the capture of the relatively smaller-sized fish species (*O. variabilis, mormyrids,* etc.) to make up for the declining *O. esculentus* catches. Although the relaxation of the mesh regulation initially led to short-lived increase in catches of fish especially *O. variabilis*, the measure resulted in the increased cropping of immature fish of this and other species. The continued removal of immature fish from the lake resulted in increasingly reduced recruitment to the breeding stocks of the species affected and this eventually led to the collapse of certain species including *O. esculentus* (Okaronon and Wadanya 1991). The use of small mesh gillnets continues to be rampant in Lake Victoria. During October 1991 and January 1992 in the Entebbe area of the lake, use of nets down to 101.4mm mesh were common in the commercial fishery. The fish (*Lates niloticus*) landed were mostly immature weighing less than 1 kg on average. Of course, mention has already been made on the effects of the intensive gillnetting of gravid individuals on their breeding migrations; this affected stocks of *Labeo* and 13 other anadromous-like species.

Following the declining catches of the traditional table fish species the exploitation of the small but abundant haplochromines was intensified during the 1960s. This involved the increased use of the beach seines. Unfortunately beach seines have damaging effects on the haplochromines and tilapiines, especially to their eggs and fry and to their breeding and nursery grounds (Welcomme 1964). The beach seines are currently being illegally used to exploit the Nile perch. In the Entebbe waters, during November 1991 and January 1992, the beach seine landings were composed mainly of small and immature Nile perch weighing between 200g and 800g. The 10 mm and 5mm mesh nets are being used for the exploitation of *Rastrineobola* *argentea*. These seine nets have been observed to take heavy tolls of juveniles of tilapiines and Nile perch (Wandera 1988) in addition to their own juveniles.

The introduction of four tilapiine species (*O. niloticus, O. leucostictus, Tilapia zillii and T. rendalli*) into Lakes Victoria and Kyoga was another management measure which was expected to replenish the declining catches due to over-exploitation (EAFFRO 1964, Welcomme 1967). The establishment of the four exotic tilapiines into the ecosystem, however, suddenly increased interspecific competition with the two indigenous tilapiine species (*O. esculentus and O. variabilis*) and enhanced the likelihood of genetic dilution due to hybridization (Lowe 1958, Welcomme 1967). Competition and/or hybridization appear to have been instrumental in accelerating the decline in tilapiine stocks in favour of only one exotic species, *O. niloticus*.

It has been argued by Ogutu-Ohwayo (1990) and several other authors that since there was only an artisanal fishery for haplochromines in the Kenya and Uganda parts of the Lake, the severe decline in the haplochromines observed particularly in Kenya and, similarly, in Uganda can be attributed to predation by *L. niloticus* and the increasing use of seine nets by the artisanal fishermen. It is further argued that the Nile perch may also have contributed to the reduction of other fishes by feeding on them as almost all types of fish which occur in Lakes Victoria and Kyoga have been identified among its stomach contents (Hamblyn 1966, Gee 1969, Okedi 1970, Ogutu-Ohwayo 1984); the Nile perch could in addition have ecologically out-competed these species. It is noted that when the introduced species became established, most fishermen inevitably switched to larger mesh gillnets to catch *L. niloticus* and *O. niloticus* which grow to a much larger size than the native tilapiine species. This reduced the fishing pressure on the remnants of the surviving native species and it should have helped them to recover but this did not happen.

Future prospects

The relatively high yields of *L. niloticus* in Lake Victoria during the 1980s were most likely due to abundance of suitable prey, the haplochromines. With the apparent disappearance of the haplochromines from Lake Victoria, *L. niloticus* is not likely to maintain the high yields previously realised when the haplochromines were abundant. Because of its capability to switch from one prey to another, the stocks of *L. niloticus* will possibly settle to a level at which they can be maintained by the available suitable prey. In the absence of the haplochromines, *L. niloticus* has been observed to feed on the small pelagic cyprinid *R. argentea,* the invertebrates particularly the prawn (*Caridina nilotica*) and its own juveniles (Ogari 1984, Ogutu-Ohwayo 1984 and 1990, Mwebaza-Ndawula 1990, Wandera 1990). Unlike the haplochromines, *R. argentea* and *C. nilotica* are available in large quantities only at certain periods of the year(Mwebaza-Ndawula 1990, Wandera). Furthermore, the biomass and dynamics of *Rastrineobola* and *Caridina* species in Lake Victoria (Uganda) are almost completely unknown. Therefore, the future of *L. niloticus* (in the lake) which will very much depend on the stocks of its current major prey, R. argentea and *C. nilotica*, is also not clear.

It is further observed that as the amount of suitable prey for *L. niloticus* is reduced, the stocks of *O. niloticus* may dominate the fishery. Taking Lake Kyoga as an example where *L. niloticus* and *O. niloticus* have inhabited for a relatively longer time than in Lake Victoria, the stocks of the predator initially increased faster than those of *O. niloticus* (Ogutu-Ohwayo 1984). A survey of stocks in Lake Kyoga in 1985 indicated the landed catch to be composed of 78.5% *O. niloticus*, 16.7% *L. niloticus*, 4.1% *P. aethiopicus* and and 0.7% for other species (Ogutu-Ohwayo 1990). More recently, during 1986-1988, observation from the same lake (Kyoga) put *O. niloticus* ahead of *L. niloticus* as follows: 95% *O. niloticus* and 3% *L. niloticus* (Marriot et al 1988). Bugenyi (pers.comm.) observed in October 1990 that the relatively poor landings of *L. niloticus* in Bukungu in Lake Kyoga were composed mostly of very young and small individuals; the same year 1990 the estimated fish production from Lake Kyoga of about 94,900 metric tonnes was composed of tilapiines (67.9%), *Lates* (27.6%), mormyrids (2.0%), *Protopterus* (1.7%) and *Clarias* (0.7%) (Uganda Fisheries Department 1990). The seemingly bright hopes that *O. niloticus* might eventually become the most important commercial species in Lake Kyoga and, perhaps, Lake Victoria should be viewed with caution given that the diet of the predator includes *O. niloticus* (Ogutu-Ohwayo 1984). The situation is further complicated by the drastic environmental changes that have occurred in Lake Victoria during the last few decades.

With the rising thermocline especially in the 40-80 metres depth zone and increasing eutrophication of the lake - partly attributed to fish introductions - (Bugenyi 1991), there is likely to be some cause for uncertainty in the stocks of certain species in the affected zones especially the high oxygen-demanding Nile perch. Nile perch and other fish species feed on lake flies which themselves feed on phytoplankton; the phytoplankton will itself be affected by changes in the environment. Quite recently the water hyacinth (*Eichhornia crassipes*) was detected inn considerable quantities in the shallow inshore waters of Lake Victoria, Uganda, where most of the fish stocks inhabit and where the artisanal fishery is currently based; the weed is reportedly spreading very fast. This weed and other floating weeds in dense mats have been reported to create deoxygenated conditions in tropical lakes (Little, 1966) and, consequently, render waters covered by it unsuitable for breeding and nursery grounds for most fish species. The continuted presence of this weed in the lake will obviously affect the stocks and, consequently, the catches.

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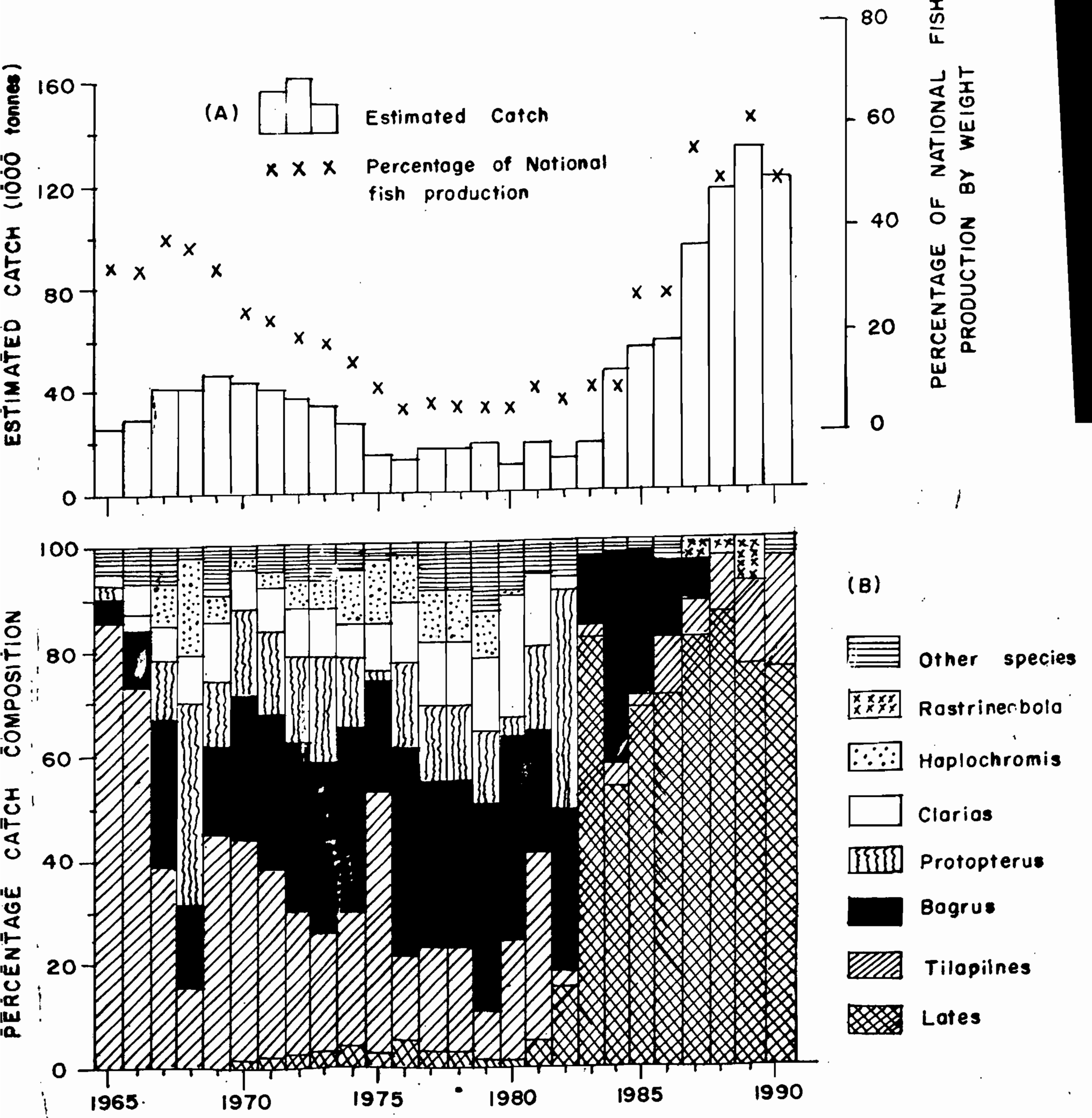

Fig. 1. Estimated fish production from Lake Victoria, Uganda, during the period 1965-1990.

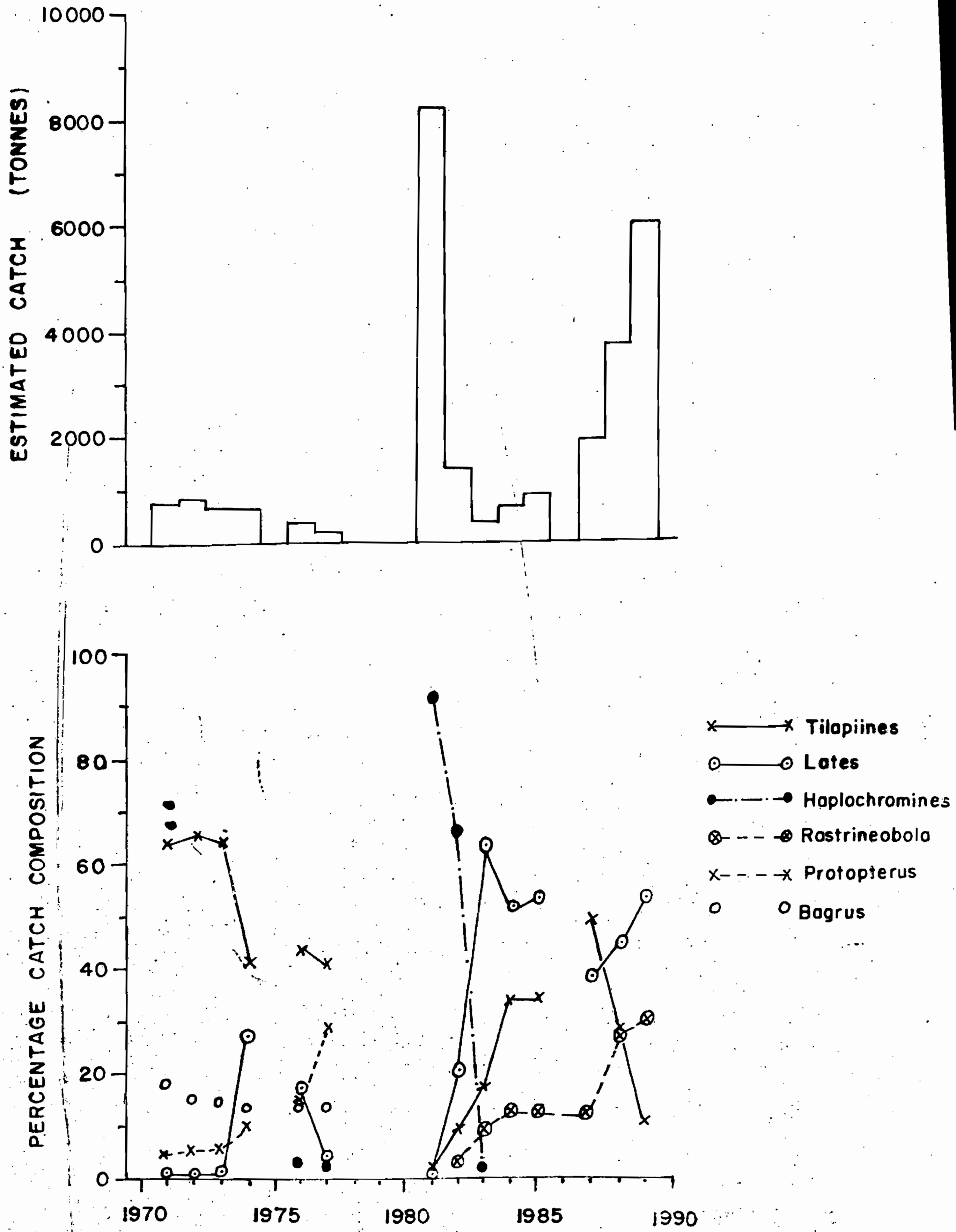

Fig. 2. Estimated fish landings at Masese Fish Landing on Lake Victoria during 1971-1989.

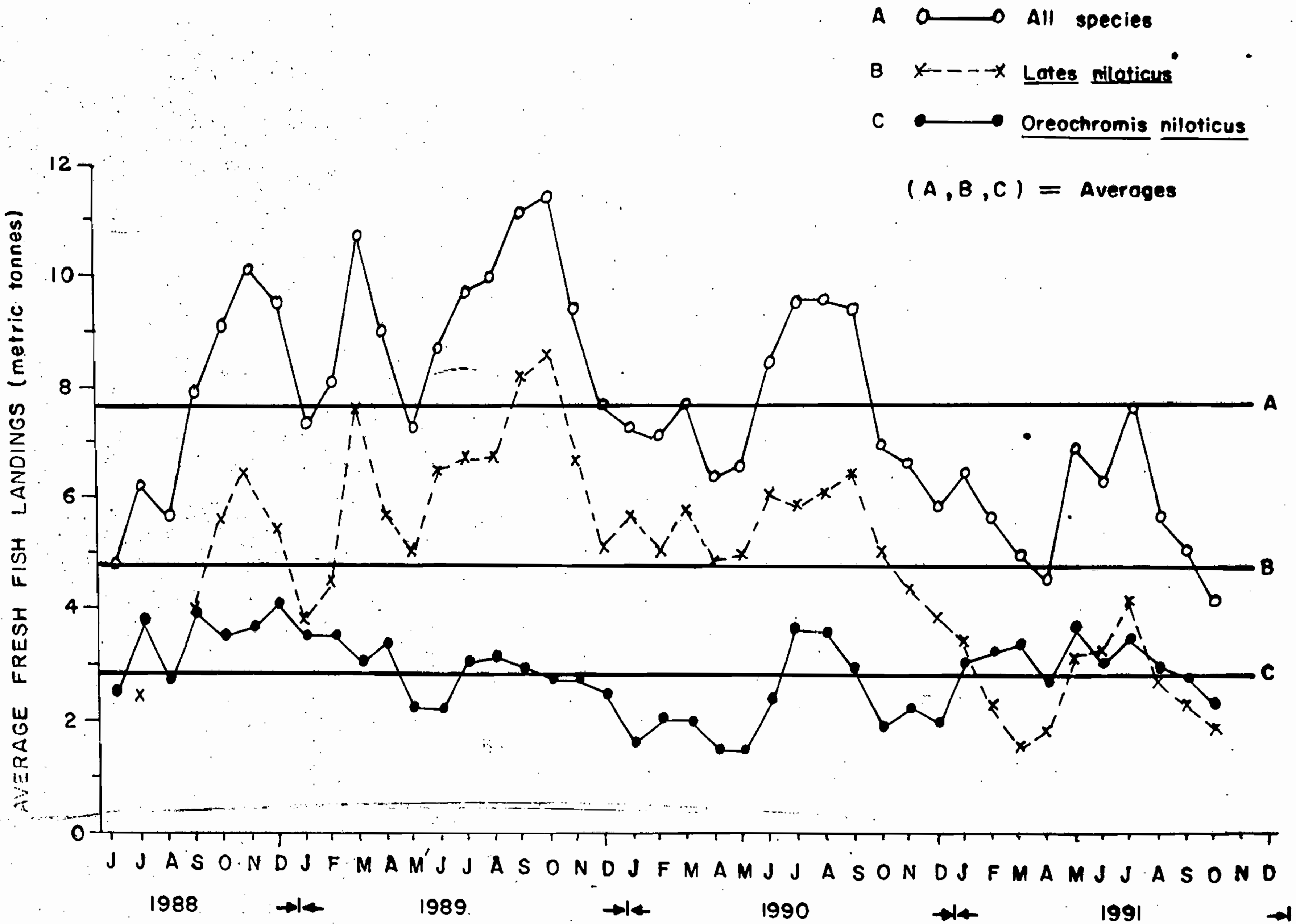

Fig. 3. Average daily landings (for fresh fish) at Masese Fish Landing on Lake Victoria.

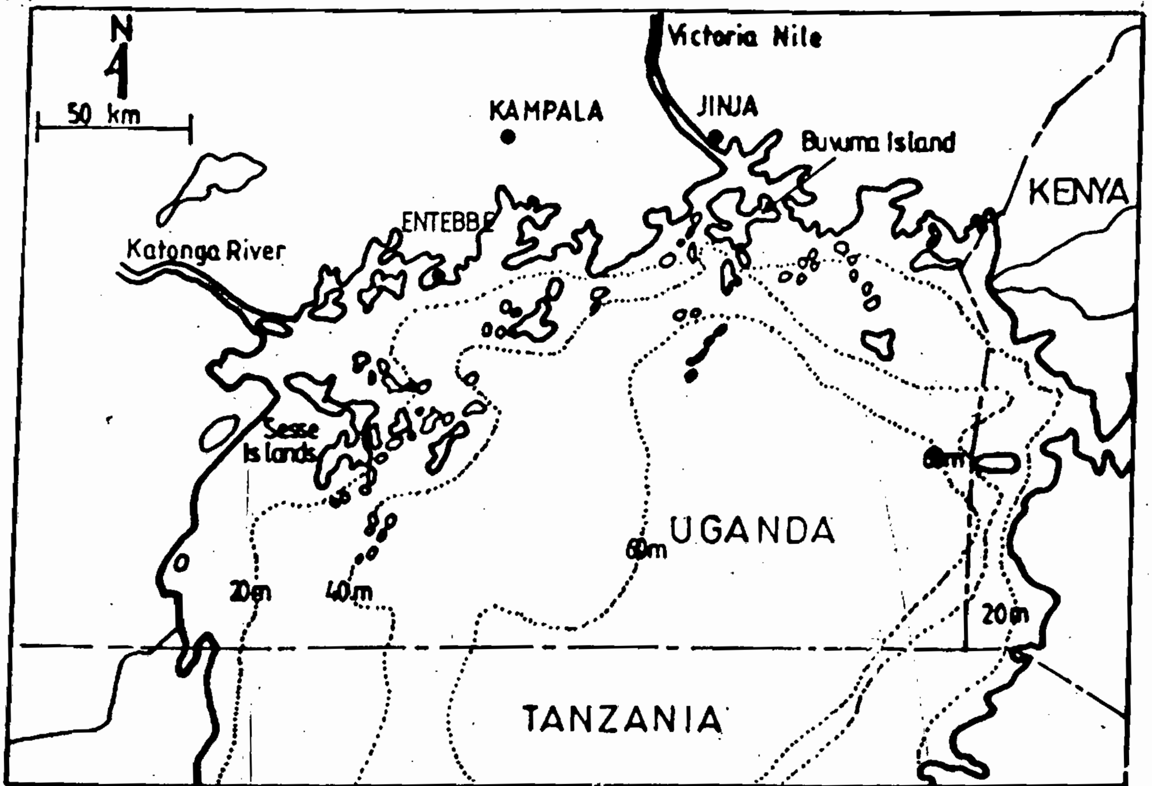

Fig. 4. Bathymetric map of Lake Victoria, Uganda.

Table 1. Trawl mean catch rates (kg/hr) of the various fishes in the northern part of the Uganda waters of Lake Victoria.

Fish species	196[illegible]-71 510 hauls Ca.500 hrs	1981 127 hauls 144.5 hrs	1982 191 hauls 223.4 hrs	1983 263 hauls 269.5 hrs	1984 110 hauls 113.3 hrs	1985 70 hauls 68.1 hrs
<u>Haplochromis</u> spp	668.20	543.30	294.34	270.84	108.48	4.78
<u>Oreochromis esculentus</u>	29.79	0.15	0.04	0.01	-	-
<u>O.variabilis</u>	1.04	8.70	1.97	1.07	0.04	0.00
<u>O.niloticus</u>	3.36	13.60	6.56	5.03	1.80	3.25
<u>O.leucostictus</u>	0.18	0.11	0.02	0.01	0.00	0.00
<u>Tilapia zillii</u>	0.00	0.00	0.00	0.00	0.00	0.00
<u>Bagrus docmac</u>	33.26	4.09	8.37	11.24	4.20	1.32
<u>Clarias mossambicus</u>	32.60	15.07	7.16	4.32	2.11	0.06
<u>Protopterus aethiopicus</u>	22.08	2.66	1.09	2.23	0.40	0.50
<u>Lates niloticus</u>	0.96	5.02	42.08	57.47	136.73	158.95
<u>Synodontis victoriae</u>	4.77	0.91	0.27	0.35	0.21	0.11
<u>S.afrofischeri</u>	0.10	0.01	0.00	0.01	0.01	0.00
Other species	2.56	0.32	1.40	2.69	0.47	0.11
Total	798.72	594.94	363.30	355.28	254.46	166.22

Table 2. Estimated fish catches in the Jinja area of Lake Victoria
(a) Commercial fish landings in Masese

Period	Total (tonnes)	Percentage by weight of Ha	Ra	Ti	Bd	Cm	Pa	Ln	Others
1971	832	1.24	-	63.88	4.84	9.62	18.49	0.67	1.47
1972	850	1.01	-	65.47	6.38	7.95	16.05	0.60	2.53
1973	698	0.04	-	64.42	6.54	11.39	16.01	1.06	1.54
1974	691	0.23	-	40.81	10.22	11.27	9.27	26.68	1.55
1975	-	-	-	-	-	-	-	-	-
1976	431	3.22	0.31	42.63	15.30	10.66	9.31	17.86	0.61
1977	235	3.32	0.64	41.34	28.98	9.95	0.95	3.90	2.90
1978	-	-	-	-	-	-	-	-	-
1979	-	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-	-
1981	8211	96.38	0.47	2.16	0.19	0.00	0.28	0.40	0.03
1982	1418	65.79	3.33	8.92	0.56	0.95	1.31	20.31	0.93
1983	427	1.35	9.07	17.03	0.67	2.04	5.09	62.70	2.08
1984	672	0.36	11.89	33.57	0.37	0.57	2.09	50.50	0.64
1985	861	-	12.07	34.13	0.12	0.40	0.13	53.00	0.15
1986	-	-	-	-	-	-	-	-	-
1987	1848	-	12.21	49.29	0.05	0.10	0.36	37.86	0.13
1988	3675	-	27.03	28.20	0.02	0.09	0.18	44.46	0.02
1989	5983	-	30.08	16.06	0.01	0.16	0.16	53.52	0.30

(b) Experimental trawl catches

1981	-	91.14	-	2.99	0.73	2.62	0.42	0.92	0.18
1982	-	81.02	-	2.34	2.30	1.97	0.30	11.58	0.45
1983	-	76.22	-	1.73	3.16	1.19	0.63	16.17	0.98
1984	-	42.63	-	0.72	1.65	0.83	0.16	57.73	0.27
1985	-	1.15	-	1.95	0.79	0.04	0.30	95.63	0.14

Ha=<u>Haplochromis</u>, Ra=<u>Rastrineobola</u>, Ti=<u>Tilapiines</u>, Bd=<u>Bagrus docmac</u>, Cm=<u>Clarias mossambicus</u>, Pa=<u>Protopterus aethiopicus</u> Ln=<u>Lates niloticus</u>

Table 3. Average size (kg) of fish landed at Masese

Period	Ov	One	Bd	Cm	Pa	Ln	One*	Ln*
1972	0.32	1.19	1.04	3.29	5.74	21.41	-	-
1973	0.29	1.31	1.07	3.54	3.74	21.61	-	-
1974	0.29	0.54	1.58	3.83	5.72	38.11	-	-
1975	-	-	-	-	-	-	-	-
1976	0.30	1.13	1.20	4.02	7.17	41.01	-	-
1977	0.34	1.05	0.86	4.44	6.93	41.54	-	-
1978	-	-	-	-	-	-	-	-
1979	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-
1981	0.38	1.21	1.07	3.35	9.14	4.81	0.69	4.30
1982	0.33	0.98	0.70	5.85	7.76	8.64	0.62	5.28
1983	0.29	1.02	0.73	4.74	8.61	5.79	0.84	5.07
1984	0.26	1.43	1.40	3.65	7.97	5.64	0.88	2.30
1985	0.35	1.42	1.71	2.58	6.62	1.57	0.99	0.84
1986	-	-	-	-	-	-	1.20	0.49
1987	0.35	1.80	2.28	3.97	7.21	4.12	-	-
1988	0.65	1.53	6.38	8.14	9.91	1.85	-	-
1989	0.35	1.08	4.63	7.16	13.68	2.39	-	-

Ov=*Oreochromis variabilis*, One=*Oreochromis niloticus eduardinanus*, Bd=*Bagrus docmac*, Cm=*Clarias mossambicus*, Pa=*Protopterus aethiopicus*, Ln=*Lates niloticus*
*Specimens obtained by experimental bottom trawling in the Jinja area of Lake Victoria.